Applicant : Scott B. Radow
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REMARKS

Reconsideration of the application as amended is requested.

Applicant notes with appreciation the Examiner's indication that claims 8, 12 and 13 contain allowable subject matter. Claim 8 has been rewritten in independent form including all of the limitations of the base claim, and is therefore believed to be in condition for allowance.

Applicant notes that the Office Action Summary for the Office Action dated June 9, 2005 indicates that claims 1-6 are withdrawn from consideration. This appears to be a typographical error because claims 6-28 were elected, and claim 6 appears to have been substantively examined in the subject Office Action. Claims 1-5 have been deleted.

In the Office Action, claims 6, 8, 12 and 13 were rejected under 35 U.S.C. §102(b) as being anticipated by Thornton U.S. Patent No. 5,242,339, and claims 14-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thornton '339 in view of Carmein U.S. Patent No. 6,152,854. Applicant respectfully submits that all of the pending claims, as amended herein, patentably distinguish over the Thornton and Carmein references.

Independent claim 6 has been amended to recite an apparatus for simulating conditions of bipedal locomotion for a human subject. The apparatus includes a conveyor defining a velocity and a velocity sensor that measures the velocity of the conveyor. The apparatus includes a force-measuring sensor, and a restraint coupled to the sensor to measure a force applied to the restraint by a human subject. The apparatus further includes a controller configured to control the velocity of the conveyor utilizing a haptic equation that incorporates an equation of motion describing bipedal human locomotion.

Support for the amendments to claim 6 can be found in the application as filed at paragraphs [0182]-[0278]. In general, paragraphs [0182]-[0194] describe equations of motion, and paragraph [0198] describes a haptic equation and controller that utilizes the equations of motion to simulate a real-world or virtual-world environment.

Applicant respectfully submits that neither Thornton '339 nor Carmein '854 disclose or suggest an apparatus as recited in amended claim 6.

More specifically, during operation of the Thornton '339 apparatus, a desired speed and angle are preselected, and the controller controls the motor to maintain the desired speed and angle that were preselected. (Column 11, lines 48-68).

Carmein '854 also does not disclose a controller that utilizes a haptic equation incorporating an equation of motion describing bipedal human locomotion. Rather, Carmein '854 states that:

> With reference to FIG. 2, for a single axis of the active surface, the Control Signal is set for zero at the center of the surface. If the position Signal is off-center, the Summing Junction generates an Error signal which is proportional to the error. A PID (proportional-integral-differential) Controller, which is well known and well characterized to those familiar with the art of motion control, is tuned to interpret the error signal over time, outputting a signal which controls motor velocity along one axis. Motor velocity and its associated direction are interpreted by the VR system as a velocity and a direction, and the image presented to the user is updated accordingly. Motor velocity also causes the active surface to be driven in a direction which reduces the Error.

Thus, Carmein utilizes a position set-point and controls the active surface based on the magnitude of the error signal (i.e., the distance of the user from center) to maintain the position of the user at the center of the surface. Clearly, a simple PID controller does not utilize "a haptic equation that incorporates an equation of motion describing bipedal human locomotion" as recited in amended claim 6.

Although Carmein '854 does disclose control of a visual image that takes into account the user's velocity vector (see also column 4, lines 14-22), control of an image is clearly much different than control of the velocity of a conveyor as recited in amended claim 6.

Claims 7, 9-11 and 14-20 depend from claim 6, and are therefore believed to be allowable for those reasons set forth above in connection with claim 6. The "haptic displays" (Figs. 5a and 5b) of Carmein '854 are also clearly much different than a controller that utilizes haptic equations of motion.

Independent claim 21 has been amended to recite an apparatus for simulating forces and movement of a human subject during a physical activity. The apparatus includes a base and a

movable member mounted to the base. The movable member defines a velocity and receives an input force applied to the movable member by a human subject. The apparatus further includes a force-generating device operably coupled to the movable member and applying a resistance force to the movable member. A sensor is configured to provide a signal corresponding to at least one of the velocity of the movable member and an input force applied to the movable member by a human subject. The apparatus further includes a controller configured to control the resistance force applied to the movable member by the force-generating device based, at least in part, on a signal provided by the sensor and a haptic equation incorporating an equation of motion of a human subject performing the physical activity being simulated.

As discussed above, Carmein '854 utilizes a PID controller that controls an active surface based on an error signal that is proportional to the distance from the zero set-point. Clearly, a simple PID controller as disclosed by Carmein '854 does not utilize a haptic equation incorporating an equation of motion of a human subject performing the physical activity being simulated as recited in amended claim 21.

Claims 22-28 depend from claim 21, and are therefore believed to be allowable for those reasons set forth above in connection with claim 21.

New claim 29 has been added. Claim 29 recites that the controller calculates at least one of a target input force and a target velocity utilizing a haptic equation of motion and controls the force-generating device based on at least one of the target input force and a target velocity. Support for new claim 29 is provided in the application as filed at paragraphs [0253]-[0278]. Paragraph [0253] describes a mode of operation utilizing a target force, and paragraphs [0268]-[0278] describe a mode of operation utilizing haptic equations of motion to determine a target velocity (see also Fig. 5D).

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Applicant has made a concerted effort to the place the present application in condition for allowance, and a notice to this effect is earnestly solicited. In the event there are any remaining informalities, the courtesy of a telephone call to the undersigned attorney would be appreciated.

Respectfully submitted,

9/9/05
Date

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